

XXIII. *The Life History, and Occurrence as British,*
of Lomechusa strumosa, F. By H. St. J.
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[Read November 6th, 1907.]

THE life history of this remarkable beetle, which has been worked out by Father Wasmann, is of the greatest interest both to the student of insect bionomics as well as the scientific entomologist.

Lomechusa strumosa is a dweller in the nests of the blood-red robber-ant *Formica sanguinea* (our most interesting indigenous species of ant both on account of its practice of making slaves and its highly intelligent habits), of which the beetle is a guest in the truest sense of the word, as it is both fed and licked by its hosts. *Lomechusa* possesses short aborted labial palpi, and patches of golden hairs on the abdomen whence the ants obtain a sweet secretion, of which they are very fond. I may here mention that I kept some *Lomechusas* in small plaster nests with glass tops, in which were also ants and other insects found in various ants' nests, including several *Myrmecetes piceus*, a small Histerid found with *Formica rufa*. These artful little beetles discovered that *Lomechusa* possessed this secretion, and would frequently climb up the legs of the beetle on to its back, where they would remain sucking at these patches for some time, often to the evident discomfort of the *Lomechusa*, which appeared somewhat agitated.

In studying living specimens of *Lomechusa* one may continually see the ants both feed the beetle and also lick it on these patches. If the plates of the abdomen be removed and put under a high power, the orifices under the hairs, whence the secretion exudes, can be well seen. The beetles also ask to be fed, by tapping the ants with their antennæ. I find, however, that they can also feed themselves. I have seen them suck at honey given to the ants, and bite at dead ants, and larvæ given to, or killed by, the latter. One beetle sucked for a long time at a cut-up *Eryx ater* larva, another attacked and sucked a live caterpillar. When a lot of ants are feeding at the honey

given to them, *Lomechusa* will come and sit amongst, and crawl over, them. In fact, the beetle is always to be found where the ants are thickest, and then it becomes practically invisible; the reason being, as pointed out by Father Wasmann, that the light which is reflected from the concave sides of the thorax appears to the eye like the narrow back of an ant, and the rolled-up abdomen of the beetle reflects the light in the same way as the rounded abdomen of a fat ant.

I was fortunate enough to observe the courtship of *Lomechusa*; as it has not been recorded before I took careful notes, and it is here described for the first time. I first saw it on the evening of May 19th this year, and subsequently noticed it on many occasions till June 9th. The ♂ and ♀ faced each other, touching their antennæ and mouths together, and tapping each other quickly. The ♂ slowly sidled round to the back of the ♀, touching her all the time with his antennæ, the ♀ moving convulsively the posterior part of her body; the ♂ tapped the posterior parts with his antennæ and mouth, then pushing his head under the body of the ♀, he raised himself on the tips of the front legs, and nearly standing on his head he bent the body right over his back and made desperate endeavours to meet the end of the female's body, when she put up her tail, the posterior part of his body opened

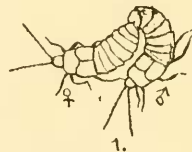


FIG. 1. *Lomechusa strumosa*, in cop.

and clasped hers like a hand and coition took place. The ♂ is then carried hanging back in the air, or walking on the tips of his front pair of legs. They separated, and after caressing each other for a short time, the same process was repeated and copulation resumed. The process of copulation lasts about half-an-hour. I introduced several pairs *in cop.* into the bowl which contains my observation nest of *Formica sanguinea*; when they separated the ♀♀ at once entered the nest, where the eggs are laid.

The only external difference in the sexes is that the antennæ are slightly longer in the ♂; as the legs are not

used in any way to grasp or hold the ♀, it can be understood why they are simple in both sexes, and not modified in the ♂.

The perfect insects appear to die off about the middle of June. I took my first specimen this year on April 27th; I exhibited it at the Royal Society on May 8th, and it died on May 30th. I was able to account for all the beetles in my observation nest, as they either came out of the nest to die, or were brought out by the ants; the last died on June 21st.

On September 8th I noticed two new *Lomechusas* out, and have since counted seven specimens altogether; these must have hatched from pupæ, or full-grown larvæ, already in the nest. Of course my study is much warmer than out of doors, and in nature these specimens would hibernate with the ants in their winter quarters by the end of September.

I introduced specimens of *Formica rufa*, *fusca*, and *exsecta*, *Lasius fuliginosus*, and *Formica sanguinea* from different nests at different times into the plaster nests with *Lomechusa*, as all my experiments* have shown that true ants'-nest dwellers are protected from the ants even of another

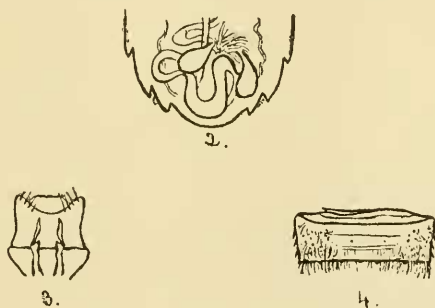


FIG. 2. Glands of *Lomechusa*. N.B.—The position of the glands is disturbed through dissection.

” 3. Labium.

” 4. Dorsal segment of Abdomen.

species, and I found that, though attacked at first, the beetles were able to protect themselves. They shook themselves, stamping with the feet and putting up their

* Cf. Ent. Record, 1901, pp. 349-353; 1903, pp. 11-12; 1906, p. 288, and 1907, p. 256.

tails, and the ants left them alone. I have discovered that when seized *Lomechusa* gives off the same smell as the species of *Myrmedonia*, and having dissected both under the microscope I found they possessed similar glands, which lie in the posterior part of the abdomen underneath the genitalia and alimentary canal, and contain the product which causes this smell.

The larva of *Lomechusa* is very like an ant-larva in appearance, and although it possesses six legs it does not use them, but mimics the attitudes of an ant-larva. The



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FIG. 5. Larva of *Lomechusa*.

ants value it very much, and on any danger threatening the nest they carry it first into safety. That the ants feed it has been proved by giving them coloured sugar, when the colour can be traced in the digestive canal of the beetle-larva through the delicate white skin. They also place it on their own larvæ, of which it devours large numbers, and Wasmann has shown that its voracity causes the production of "Pseudogynes," or false females, in the nest. These are neither perfect females nor perfect workers, but of an intermediate form which does not work or bite. They are brought about in the following way: The numbers of worker-larvæ consumed by *Lomechusa* causes a decrease in the workers produced in the nest. Now, as is well known, ants can create females by feeding their larvæ on special food, and to make up for the loss of workers they try to turn larvæ which they have started to bring up as females into workers, the result being these "Pseudogynes."

"Pseudogynes" only occur in nests where *Lomechusa* has been for some years, and they will not be found in all nests where *Lomechusa* is present, though of course the beetle will be found where "Pseudogynes" occur, and these nests are the centres from which the beetle spreads to other nests.

At first the beetle is kept in check by the ants digging up its pupa and carrying it about as they do their own, which of course kills a delicate beetle pupa, but as more

"Pseudogynes" are produced fewer pupæ are dug up, till at last the destruction of the colony is brought about.

In North America a beetle, *Xenodusa cava*, closely related to *Lomechusa*, occurs with *Formica rubicunda*, a race of *Formica sanguinea*. Father Wasmann stated that "Pseudogynes" must occur in those nests; at first they could not be found, but after some time his correspondents succeeded in finding them in nests which contained the beetle, a veritable triumph for his theory.

The distribution of *Lomechusa strumosa* embraces the whole of Europe, North and Central Asia as far as Tibet.

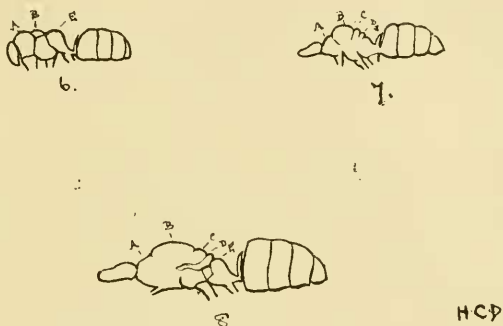


FIG. 6. *Formica sanguinea*, ♂.
 " 7. " " Pseudogyne.
 " 8. " " ♀.
 A. Pronotum. B. Mesonotum. c. Scutellum.
 D. Post-scutellum. E. Propodeum.

The history of *Lomechusa* as a British species is as follows:—In Stephens' "Illustrations, Mandibulata, Vol. iv, p. 108 (1832), we read: "Very rare: I have hitherto seen two specimens (which are in the British Museum) only, one of which, I was informed by Dr. Leach, was taken by Sir H. Sloane, on Hampstead Heath in 1710; the other was captured by himself while travelling on the mail-coach between Cheltenham and Gloucester about twenty years since." These two specimens are still in the Museum at South Kensington. It is given as British in G. R. Waterhouse's catalogues of 1858 and 1861, and Rye's of 1866. In Crotch's catalogue of 1863 it is "reputed British," and in his second edition, 1866, as "doubtfully indigenous." After this it is altogether

omitted from all our catalogues and books on Coleoptera. On May 25th, 1906, it was re-discovered by me at Woking. I was collecting with the Rev. F. Morice at the time, and we were looking for nests of *Formica sanguinea*, Mr. Morice having asked me to show him how I took beetles in ants' nests. My companion found a nest under an old boot, which drew blank. I subsequently found two more nests near together, on another part of the common, and whilst examining one of them I met with the first specimen of this very fine beetle. On the 29th I went down again and dug up the other nest, when seven more of the beetles were taken. These nests were in a bank, and the ants had covered them with short cut grass, a type of nest very difficult to be found by the uninitiated. These are summer quarters; in the winter the ants go deep down under the ground. The beetle was again found sparingly in the autumn.

This year diligent search in the spring for nests was rewarded, a large number being found, and the beetle was turned up in numbers; indeed in one nest alone over sixty specimens were taken, plenty of material being thus obtained to supply other Coleopterists with examples for their collections, as well as for my own observations and experiments. Several nests were established on suitable private ground near at hand, where I had previously found both the ant and the beetle, and where they would be undisturbed for future observation. One nest with eight queens was brought home to my study and fixed up in a large glass vessel to act as an observation nest. I may mention that *Lomechusa* was found again this autumn, though not in such numbers as in the spring. The only other species of beetles I found in these nests were *Dinarda dentata* in plenty (a new locality for it) and *Myrmedonia limbata*.

In conclusion I should like to express my best thanks to Sir Charles Dilke for his kindness and courtesy in allowing me to make use of his property at all times for the observation and study of this beetle in nature, as well as for a natural preserve for the ants and their nests; to Father Wasmann for his kind encouragement of my studies in Myrmecophilous Entomology; to my friend Dr. H. Armit for kind assistance in dissecting and chemical experiments; and to my friend Mr. Hereward Dollman for his admirable drawings.